

CLAIMS

1. A screw mechanism having a member to be tightened (3) being tightened and fixed by screwing one screw member on a tightening side (1) to another screw member (2) characterized by making a pair of inclined surfaces (6) interpose between the screw member on the tightening side (1) and the member to be tightened (3) in a mutually contacted state, said inclined surfaces (6, 6) circling around once in spiral form with a lead smaller than a lead of the screw, both ends thereof being connected with a tier face (7) in the axial direction.

2. The screw mechanism according to claim 1, wherein
said inclined surfaces (6, 6) are formed on mutually contacting surfaces of a pair of washers (4a, 4b) interposed between the screw member on the tightening side (1) and the member to be tightened (3).

3. The screw mechanism according to claim 1, wherein
one (6) of said pair of inclined surfaces (6, 6) is formed on a surface of a screw member on the tightening side (12) on the member to be tightened side, and the other (6) is formed on said washer (4b) interposed between the screw member on the tightening side (1) and the member to be tightened (3).

4. The screw mechanism according to claim 2 or claim 3, wherein
an outer circumference of said washer (4) is made roughly a same shape as a mating portion having a different diameter transferring a tightening torque applied on an outside circumference of the screw member on the tightening side (1).

5. The screw mechanism according to claim 2 or claim 3, wherein
said mating portion having a different diameter of said washer (4) or the screw
member on the tightening side (1, 12) having said inclined surface (6) formed, is
composed of polygon faces; and

a plurality of codes or symbols (10) with regularly increasing values are
sequentially appended to sequentially adjacent side faces next to a face corresponding to
a forming position of said tier face, in one direction of an inclination direction of said
inclined surface.

6. The screw mechanism according to claim 2, wherein
both of the pair of washers (14a, 14b) are pre-fixed to break away with a
rotating torque of a tightening in a state of making said inclined surfaces (6) of said pair
of washers (14a, 14b) coming into contact with each other, and said pair of tier faces
(7, 7) being spaced with a prescribed interval.

7. The screw mechanism according to claim 2, wherein
a graduation (16) is formed on the outer circumference of said washer (14)
along one direction in the inclination direction from the formed position of said tier
face (7).

8. The screw mechanism according to claim 6, wherein
pre-fixing means is composed of an adhesive tape (17) pasted on the outer
circumference of said washers (14a, 14b), and an achievable tightening axial force is
indicated on an outer face of said pre-fixing means.

9. The screw mechanism according to claim 6, wherein

said pre-fixing means is composed of an adhesive tape (17) pasted on the outer circumference of said washers (14a, 14b), and a plurality of tear-off-cuts (17a) are provided intermittently on a circumference direction on said adhesive tape (17) in a vicinity of a contacting face of both of said washers (14a, 14b).

10. The screw mechanism according to any one of the claims 6 to 9, wherein both of said washers (14a, 14b) are pre-fixed with grease applied between said inclined surfaces (6, 6).

11. A double nut characterized by forming an inclined surface (6) on pressure-contacting surfaces of a pair of nut members (18, 18), wherein said inclined surface circles around once in spiral form with a lead smaller than a lead of a screw, and both ends thereof are connected with a tier face (7) in the axial direction; and

having female screws processed on both of said nut members (18), in a state with both of said inclined surfaces (6) brought into contact with each other, and an interval in the rotating direction being provided between said tier faces (7).

12. A tightening method of a screw mechanism for tightening and fixing a member to be tightened (3) by screwing one screw member on the tightening side (1) to another screw member (2), wherein said method is characterized by comprising the steps of:

initial-tightening of the screw member on the tightening side (1) with an initial rotating torque; and

tightening and rotating the screw member on the tightening side (1) for a preset

angle.

13. The tightening method of a screw mechanism according to claim 12, wherein

a tightening axial force generated by said initial-tightening is made to be one-tenth or less of a tightening axial force on completion of the tightening.

14. The tightening method of a screw mechanism according to claim 12 or claim 13, wherein said tightening method comprising the steps of:

interposing a pair of inclined surfaces (6, 6) between the screw member on the tightening side (1) and the member to be tightened (3) in a mutually contacted state, wherein said inclined surfaces circle around once in spiral form with a lead smaller than a lead of the screw, and both ends thereof are connected with a tier face (7) in the axial direction;

conducting the initial-tightening in a state with an interval of a preset angle maintained between said tier faces (7, 7) of said pair of inclined surfaces (6, 6); and

tightening and rotating the screw member on the tightening side (1) until the tier faces (7, 7) come into contact with each other, after said initial-tightening.

15. A screw mechanism characterized by comprising:

a first inclined surface (31) provided on one screw member (21) of either a male screw member (21) or a female screw member (22), or on a member (24) integrally rotating with said one screw member relative to another member, wherein said first inclined surface (31) circles around once in spiral form, and both ends of said inclined surface (31) are connected with a tier face (32) in an axial direction;

a second inclined surface (31) provided on another screw member (22) of either the male screw member (21) or the female screw member (22), or on a member (25) integrally rotating with said screw member (22), wherein said second inclined surface (31) face-contacts with said first inclined surface (21), and both ends of said inclined surface (31) are similarly connected with a tier face (32) in the axial direction; and

recess-concave-portions (33, 34) provided on an end portion next to said tier face (32) of said inclined surface (31); and wherein

a spiral lead of both of said inclined surfaces (31, 31) are configured to be bigger than a screw lead of both of the screw members (21, 22).

16. The screw mechanism according to claim 15, wherein stoppers (43, 44) maintaining a reverse-lock state by mutually mating are installed in protrusion on said recess-concave-portions (33, 34) of said inclined surface (31), wherein said reverse-lock is conducted by rotating in an opposite direction of an tightening direction and locking after tightening and fixing the male screw member (21) and the female screw member (22).

17. The screw mechanism according to claim 15 or claim 16, wherein a member (24, 25) integrated in a rotating direction with the male screw member (21) or the female screw member (22) is constituted by a washer (24, 25), wherein

said washer has non-slip-means (29) provided on a seat portion (27) on one end side, and has said inclined surface (31), said tier face (32), and said recess-concave-portions (33, 34) formed on an end face of a cylinder portion (28) on another end side

thereof.

18. A screw mechanism characterized in comprising:

a first inclined surface (31) provided on one screw member (42) of either a male screw member (41) or a female screw member (42), or on a member integrally rotating with said one screw member relative to another member, wherein said first inclined surface circles around once in spiral form, and both ends of said inclined surface are connected with a tier face (32) in the axial direction; and

a washer (26) having a second inclined surface (31) face-contacting with said first inclined surface (31), both ends of said second inclined surface being similarly connected with a tier face (32) in the axial direction, and non-slip-means (29) on a seating-face on the opposite side of said inclined surface (31), wherein

a spiral lead of both of said inclined surfaces (31) is configured to be bigger than the screw lead of both of the screw members (41, 42), and

a member to be tightened (45) with low anti-crack characteristics against pressure, such as glass, ceramic, or plastic, is tightened and fixed between a member (40) integrated in the rotating direction with the other screw member (41) of either the male screw member (41) or the female screw member (42), and the washer (26).

19. A screw mechanism having a member to be tightened (23) tightened and fixed by screwing one screw member (22) to the other screw member (21), wherein said screw mechanism is characterized by arranging between opposing surfaces of a screw member on the tightening side (21) and a member to be tightened (23),

a first washer (24) having an inclined surface (31) circling around once in

spiral form, both ends of said inclined surface being connected with a tier face (32) in an axial direction; and

a second washer (25) having an inclined surface (31) face-contacting with said inclined surface (31) of said first washer (24), both ends of said inclined surface being similarly connected with a tier face (32) in an axial direction, wherein

spiral leads of said inclined surfaces (31) of both of said washers (24, 25) are configured to be bigger than a screw lead of said screw members (21, 22), and

a friction force between the screw member on the tightening side (21) and said first washer (24) is constituted to be bigger than a friction force between said inclined surfaces (31, 31) of both of said washers (24, 25), and smaller than a friction force between said second washer (25) and the member to be tightened (23), before and after the completion of the tightening.

20. The screw mechanism according to claim 19, wherein

a spiral lead angle of said inclined surface (31) is made to be two times or less the lead angle of the screw.

21. The screw mechanism according to claim 19, wherein

the friction force between the screw member on the tightening side (21) and said first washer (24) is constituted to be two to four times the friction force between said inclined surfaces (31) of both of said washers (24, 25).

22. The screw mechanism according to claim 19, wherein

a non-slip-protrusion-group (49) is provided on seating-surfaces contacting with each of opposing surfaces of the screw member on the tightening side (21, 42) and

the member to be tightened (23) of said first and second washer (24, 25), and

a hardness of the opposing surface of the screw member on the tightening side (21, 42) is made to be lower than the hardness of said non-slip-protrusion-group (49), and the hardness of the opposing surface of the member to be tightened (23) is made to be lower than the hardness of the opposing surface of the screw member on the tightening side (21, 42).

23. The screw mechanism according to claim 19, wherein

said non-slip-protrusion-group (49) is provided on the seating-surfaces contacting with each of the opposing surfaces of the screw member on the tightening side (21, 42) and the member to be tightened (23) of said first and second washer (24, 25), and

a non-slip-protrusion-group (47) of a different pitch is provided on the opposing surface of the screw member on the tightening side (21, 42).

24. The screw mechanism according to claim 22 or claim 23, wherein

said non-slip-protrusion-groups (47, 49) are constituted by a plurality of streaks of non-slip-protrusion-bands (48, 50) in annular or radius direction, and arranged and installed with an appropriate interval (48a, 50a).

25. The screw mechanism according to claim 23, wherein

a friction-force-adjusting-sheet is interposed between the opposing surface of the screw member on the tightening side (21, 42) and the seating-surface of said first washer (24).

26. The screw mechanism according to claim 25, wherein

said friction-force-adjusting-sheet is composed of a cloth or a paper containing abrasive-grains.

27. The screw mechanism according to claim 19, wherein a latching-ring (36) is provided,

said latching-ring (36) has a planar and C-lettered form, and can be fitted onto an outer circumference of said first and second washers (24, 25) elastically,

a tongue piece (37) is installed in protrusion in an inner circumference of said latching-ring 36, fitting into a clearance (38) generated between said tier faces (32, 32) of said first and second washers (24, 25), in a state of reverse-lock having been conducted, where said reverse-lock locks by rotating in an opposite direction of the tightening direction, after tightening the screw member on the tightening side (21, 42).